SIEMENS

UROSKOP D

SP

Maintenance Instructions

The maintenance protocol
RLL5-310.105.02.02.02
is required for this instructions

English
Doc. Gen. Date: 01.97

Print No.: RLL5-310.101.02.02.02

Replaces: RLL5-310.101.02.01.02

Chapter	Page	Revision
0	1 - 4	02
1	1 - 4	02
2	1 - 16	02
3	1 - 2	02

Page

This page intentionally left blank.

1 General information

NOTICE

The sequence for complete inspection and maintenance is described on the following pages.

The safety inspection may be performed alone; however, the operating values check must be performed in conjunction with the safety inspection.

1.1 Required documentation

depending on the system)

- UROSKOP D1 circuit diagram G5353
- UROSKOP D2 circuit diagram G5354
- UROSKOP D3 circuit diagram G5403
- Adjustment instructions RLL5-310.071.01.02.01
- Uroskop D1/D2 start-up instructions RLL5-310.034.01.04.01
- Uroskop D3 start-up instructions RLL5-310.034.02.03.01
- Maintenance protocol RLL5-310.105.02.02.01

1.2 Required tools, measurement and auxiliary equipment

- Protective conductor meter 44 15 899 RV090
- DVM e.g. Fluke 8060 84 27 684 RE999
- Torque wrench, to 100 Nm
- Spring scale, to 2.5 N
- Spring scale, to 100 N
- Standard service equipment

1.3 Required lubricant

• Grease gun for Longtime PD2		71 09 010
• Longtime PD2 - grease	20 g tube	34 91 271
	1 kg can	73 95 445
• Optimol Optiflex ELM paste	1 kg can	15 90 293
• Silicon paste	100 g tube	20 49 914

1.4 Text emphasis

⚠WARNING	**"WARNINGs" are information provided with special emphasis when there is the potential for injury to operator or patients.**
CAUTION	**"CAUTIONs" are information provided with special emphasis when there is the potential for damage to the equipment.**
NOTICE	**"NOTICEs" are information provided with special emphasis to facilitate proper use of the equipment or proper execution of a procedure.**

1.5 Safety instructions and protective measures

CAUTION

- When performing service work and tests adhere to:
  - **the product-specific safety information in the document,**
  - **the safety instructions in RA0-000.012.40... in the UROSKOP D - Logbook, as well as**
  - **the general safety information contained in the TI folder / ARTD Part 2 (CD-ROM) .**
- **Tests and adjustments thamust be performed with radiation ON, are identified by the radiation warning symbol ☢. Radiation protection must be worn during these types of adjustments.**

1.6 Explanation of abbreviations

Abbrev.	Explanation
SI	Safety Inspection
SIE	Electrical Safety Inspection
SIM	Mechanical Safety Inspection
PM	Preventive Maintenance
PMP	Preventive Maintenance, Preventive Parts Replacement, Visual Inspection, etc.
PMA	Preventive Maintenance Adjustments
PMF	Preventive Maintenance, Function Check, Operating Value Check
Q	Quality Check
QIQ	Image Quality Check
QSQ	System Quality Check
SW	Software Maintenance

The items identified by these abbreviations are contained in the maintenance certificate and should be checked off upon completion.

This page intentionally left blank.

2 Inspection and maintenance

2.1 Visual inspection

PMP Damage

- Inspect the entire system for mechanical damage.
- Replace defective parts or repair them, where appropriate.

2.2 Safety inspection

2.2.1 System

SIM Covers

- Remove the covers from the lifting base, the spotfilm device and the X-ray tube support arm / rotation drive.

2.2.2 System base

SIM Torque

Check the torque (85 Nm) of the four mounting screws on the lifting base.

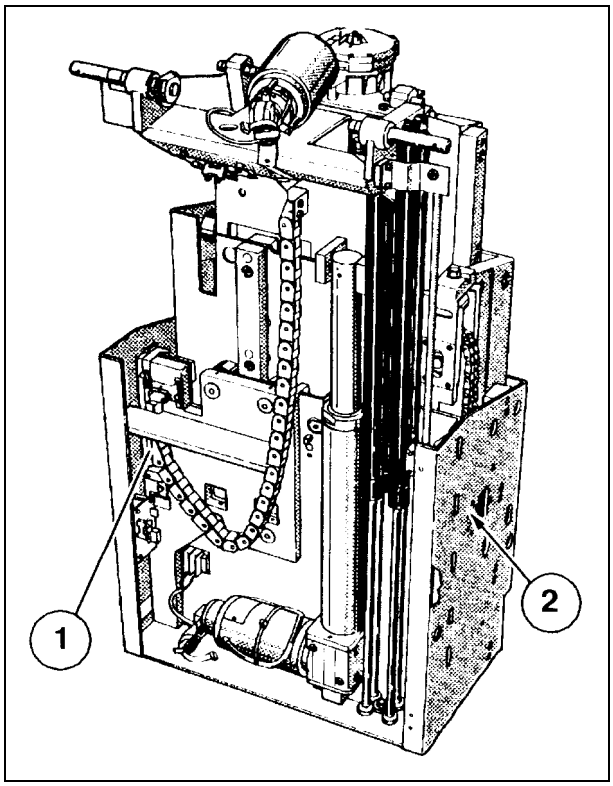

Fig. 1

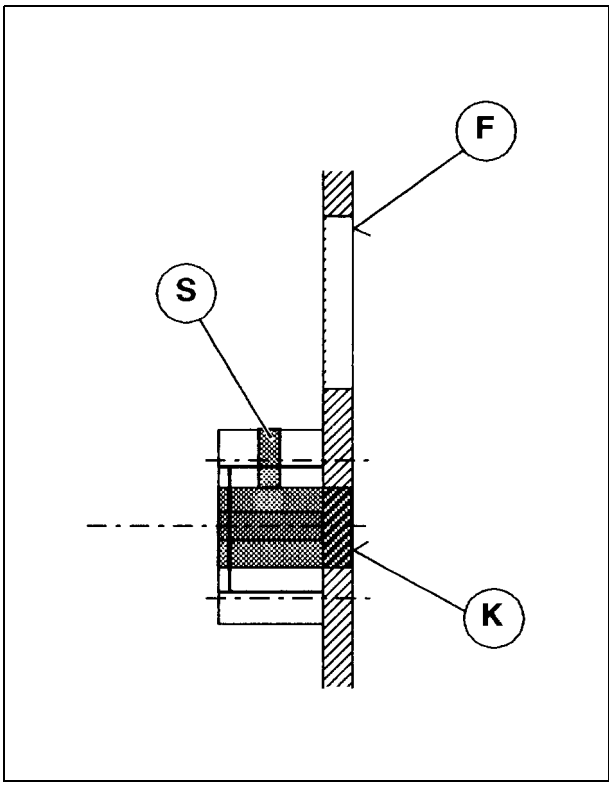

Fig. 2

2.2.3 Lifting drive

SIM Actuator cams

SIE Safety limit switch

- Slide the actuator cams (1/Fig. 1) of safety switches s21 and s22 by hand (when activating the switch, the K1 contactor in M20 drops) At the same time, check that the actuator cam moves easily.
- Raise the system to +88°.

SIE Travel range

- Move the system vertically over the complete range of travel, checking for noise and smooth travel.
- Measure the maximum vertical position 1080 mm and the minimum vertical position 620 mm with a tape measure between the lower edge of the lifting base and the rotating axis.

SIM Chain coupler

- Check the chain coupler position on the outside of the lifting base (2/Fig. 1/2); the bolt for the chain coupler (K1) must firmly connect with the outer surface of the lifting base (F) (Fig. 2).
- Check that the safety screw (S) is secured tightly.

2.2.4 Tilt drive

SIM Actuator cams

SIE Safety limit switch

- Push the actuator cams for safety limit switches s31 and s32 by hand. When the switch is activated, the K1 contactor in M20 drops.
- Check that the actuator cam moves easily.

SIE Travel range

- Move the system over the entire travel range of +88° to -15°and back checking for noise and ease of movement.

2.2.5 Rotating column drive

SIE Safety limit switch

SIM Actuator disk

- Position the table horizontally.
- Turn the actuator disk for the safety switch S41 right and left by hand until the switch activates (the contactor K1 in M20 must drop. Also check that the actuator disk moves easily.

SIE Travel range

- Move the system over the entire travel range from +15° to -15° and back checking for noise and ease of movement.

2.2.6 Longitudinal table drive

SIM Actuator cams

SIE Safety limit switch

- Activate safety limit switches s71and s72 by hand.When the switch is activated, the K1 contactor in M20 drops.
- In both end positions, the actuator cams must stop approximately 5 mm before the respective switch.

SIE Travel range

- Measure the travel range of 573 cm toward the physician’s side and 227 cm in the headward direction (from the edge of the tabletop on the physician’s side to the white plastic piece in the table rail) and check for noise and smooth travel.

2.2.7 Transverse movement drive

SIE Limit switch

SIM Travel range

- Move the system over the entire travel range and check whether the limit switches are activated:
  - in the back tabletop position
    (31.5 cm distance between the table rails and the rotation drive cover)
  - in the front tabletop position (55.5 cm distance)
- whether at a distance of 45.5 cm (in the "center" position)
  - switch s61 responds and the tabletop stops

SIM Ease of movement / play

- Move the system over the entire travel range again and check for ease of movement and play in the transverse direction.

2.2.8 Tabletop

SIM Chains

- Check that the chains are securely mounted.

SIM Chain coupler

- Check that the chain coupler on the tabletop is secure.

SIM Safety distances

- Raise the table to +88° and move it to maximum and minimum height.
- Check the safety distance to the floor and to the ceiling (to the lights or to other ceiling-mounted devices).
- Move the tabletop in the horizontal position.
- Insert the 87 cm long tabletop extension on the physician’s side.
- Move the table on the physician’s side to the maximum end stop.
- Check the safety distances to the wall or to other fixed installations.
- Insert the tabletop extension on the head end.
- Move the table headward to the maximum end stop.
- Check the safety distances to the wall or to other fixed installations.

2.2.9 System general

SIE Main operating console

- Check all functions on the main operating console.

SIE Footswitch

- Check the exposure and fluoro functions of the footswitch with the SS switch off.

SIE IR footswitch

- Check all functions of the IR footswitch.

SIE Tableside control

- Check all functions of the tableside control unit making sure to connect the unit to the X-ray tube arm as well as to the spotfilm device.

SIM Accessories

- Check all accessories to be sure that they mount securely on the system.

SIM Cables and corrugated tubing

- Check that all the cables and corrugated tubing are in good condition, if they are accessible.

SIM Cables and corrugated tubing

SIM Strain relief

- Where accessible, check all strain reliefs on the cables and corrugated tubing for correct position and secure mounting.

SIM Cable mounts

- Check all cable mounts where accessible for the cables and corrugated tubing for correct position and secure mounting.

2.2.10 Safety devices

SIE Emergency OFF switches

- Press the emergency OFF switches in sequence and individually:
  - at the spotfilm device
  - on the main control console
  - on the X-ray tube arm

When the emergency STOP switch is activated:
- Error **U01** must appear in the area dose product display.
- Error **0050** must appear on board D1 in M20.
- system movements must be blocked.

- Unlock the emergency OFF switches on the system
  - the system must automatically reset.

SIE Emergency OFF switch on-site

- Press the emergency OFF switch at the customer site:
  - the entire system must be switched off and
  - you must not be able to switch it on from anywhere else.
- Unlock the emergency OFF switch on-site and reconnect the system contactor:
  - the entire system can now be switched on.

SIE Connect the housing with the protective conductor

- Check the connections of all green-yellow protective conductors to the cabinet walls, assemblies and covers.

SIE Protective conductor test

SIE FI Ground fault detector

- Measure the protective conductor connections with the protective conductor meter according to TI 236, section VII. The protective conductor rail in N16 of the generator is the central protective conductor.
- Activate the test head of the ground fault detector to check the mechanical function.
- Check the ground fault detector according to TI 236 for electrical function.
- The protective conductor connections and the ground fault detector function must be checked again with the system closed when all service work is finished.

2.2.11 Checking radiation protection

SIM Radiation protection devices

- Check any existing radiation protection shields at the collimator (visual inspection).

SIE Indicator “Radiation on”

- Release an exposure with 40 kV and 2 mAs and check whether the radiation ON indicators light up on the system and the main operating panels.

SIM Format collimation

- Close the collimator.
- Insert a 24 x 30 cm cassette lengthwise in the spotfilm device.
- Switch on the light localizer.
- Switch on format collimation with the hand-held control unit (press the key with the light symbol until the LED lights up); the light field displayed must adjust to the 28 cm x 23 cm size (measured on the tabletop).
- Select the 2-on-1 segmentation on the main control console; this must produce a light field measuring 28 cm x 11.5 cm (measured on the tabletop).

SIE Iris diaphragm (Uroskop D2/D3 only)

- Briefly switch on fluoro for every I.I. format and check whether the iris diaphragm is visible at the edge of the post-blanking circle.

2.3 Periodic maintenance / parts replacement

PMP Transport belt

- After five years of service or when worn, replace the belt for the cassette clamping drive according to Service Instructions RLL5-310.091.06.

PMP Rotating belt

- After five years of service or when worn, replace the belt for the cassette loading according to Service Instructions RLL5-310.091.

2.4 Inspection for wear and tear

PMF Vertical drive

- Check for unusual noises, e.g. cracking noises when moving the vertical drive over the entire travel range and in both directions.

PMF Gas springs

- Disconnect the motor cable on connection point M2/X1/1.
- Connect a DVM between the motor and the motor cable.
- Lower the table with the motor and measure the current on motor am2.
  In the lowest position, the current should be approximately 11.5 A. This confirms that the gas springs are functioning correctly.

PMP Transport chain

- Visually inspect the transport chain for the lifting drive for wear and tear.

PMP Tilt drive

- Raise the table to +88°and visually inspect the mechanics of the tilt drive for wear and tear.

PMP X-ray tube support arm / rotation drive

- Move the X-ray tube support arm in the +15° and -15° end positions respectively and visually inspect the rotation drive spindle for wear and tear.

PMP Longitudinal table drive - drive belt

- Visually inspect themotor drive belt at 7 for wear and tear.

PMP Transverse table drive - ball bearing guide

- Visually inspect the ball bearing guide for wear and tear.

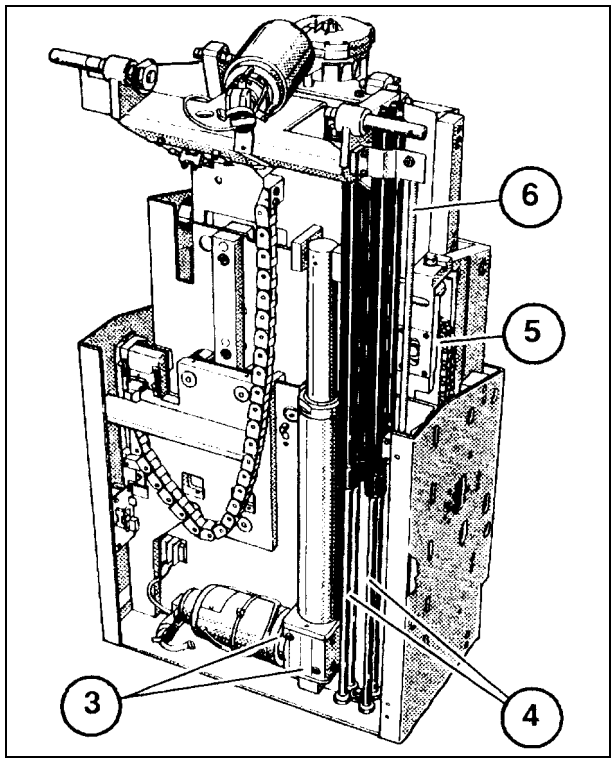

Fig. 3

2.5 Maintenance

2.5.1 Vertical drive

PMP Vertical cylinder

- Remove the two screws (3/Fig. 3) on the vertical cylinder and lubricate with **LONGTIME PD2**.
  Use the grease gun (Item no. 71 09 010) with the pointed nozzle.
- Reinstall both screws (3/Fig. 3) and tighten them.

PMP Gas springs

- Lightly lubricate the polished metal parts (4/Fig. 3) of the gas springs with **OPTIMOL OPTIFLEX ELM**.

PMP Chain guide

- Lightly lubricate the chain guide (5/Fig. 3) where accessible with **LONGTIME PD2**.

PMP Toothed rack

- Lightly grease the toothed rack (6/Fig. 3)of the potentiometer drive (r102) with **LONGTIME PD2**.

2.5.2 Tilt drive

PMP Linear bearing

- Lightly grease the linear bearings with **LONGTIME PD2**.

PMP Bearing track of the tilt function

- Lightly grease the bearing track with **LONGTIME PD2**.

PMP Tilt spindle

- Lightly grease the tilt spindle with **LONGTIME PD2**.

PMP Ball bearing guides

- Lightly grease the ball bearing guides with **LONGTIME PD2**.

PMP Toothed gears

- Lightly grease the toothed gears of the potentiometer drive (r103), with **LONGTIME PD2**.

2.5.3 Rotation drive

PMP Spindle (Uroskop D2/D3 only)

- Grease the rotation drive spindle with **LONGTIME PD2**.

2.5.4 Longitudinal table drive

PMP Rails

- Clean the guide rails and lightly grease them with **silicon paste**.

2.5.5 Spotfilm device

PMP Cleaning

- Clean the entire spotfilm device inside, where accessible.

2.5.6 System general

PMP Contrast agent residues

- Remove any contrast agent residues and other contamination from points on the system normally not accessible to the customer.

PMP Cables and hoses

- Clean all accessible cables and hoses.

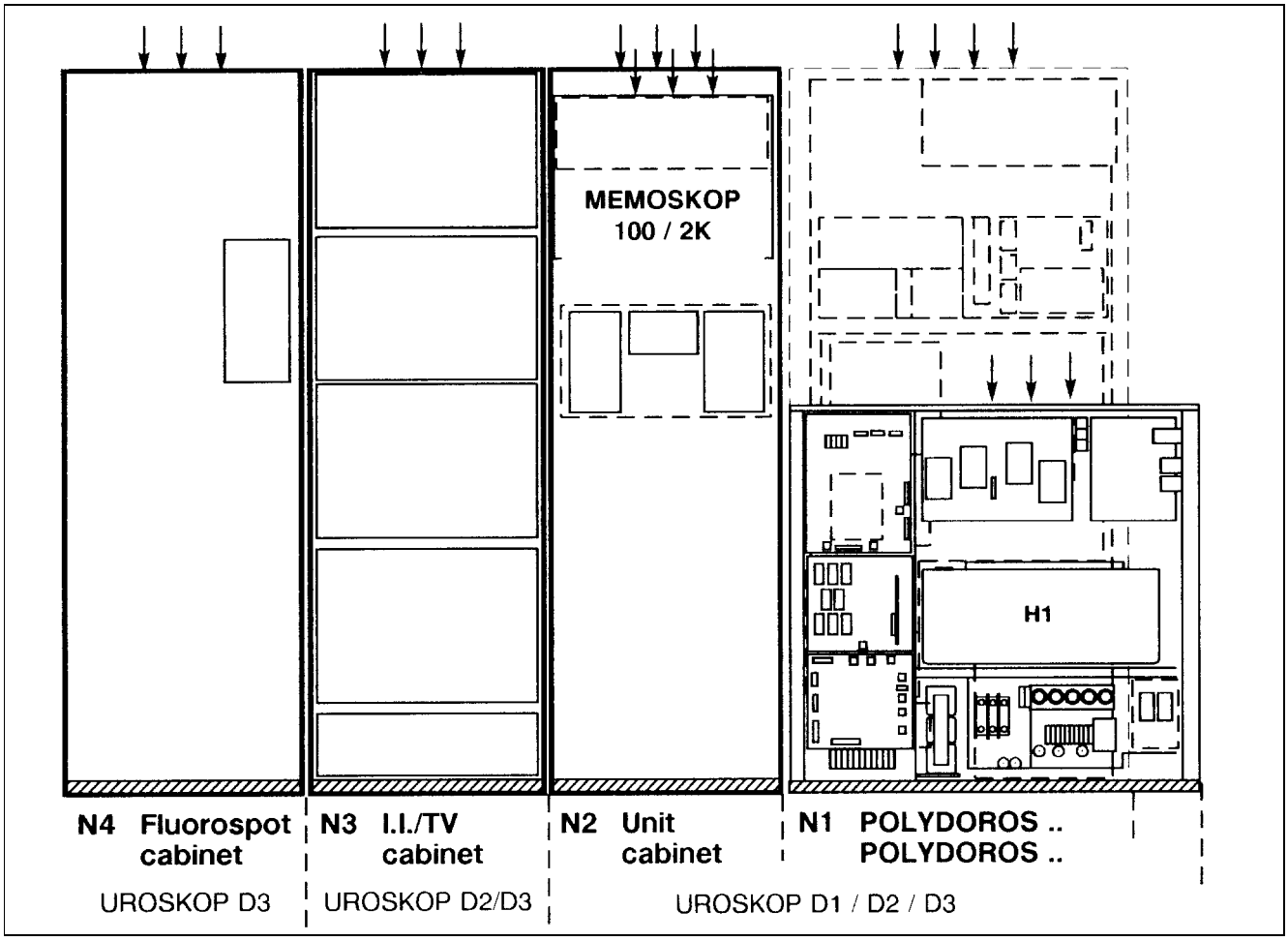

Fig. 4

2.6 Inspecting the internal heat dissipation

2.6.1 Cabinets

PMP Air vents

- Inspect all air vents on the system cabinets and make sure that there are no obstructions, e.g. clogged by dirt, etc. (Fig. 4).
- If necessary, clean any vents that are clogged.

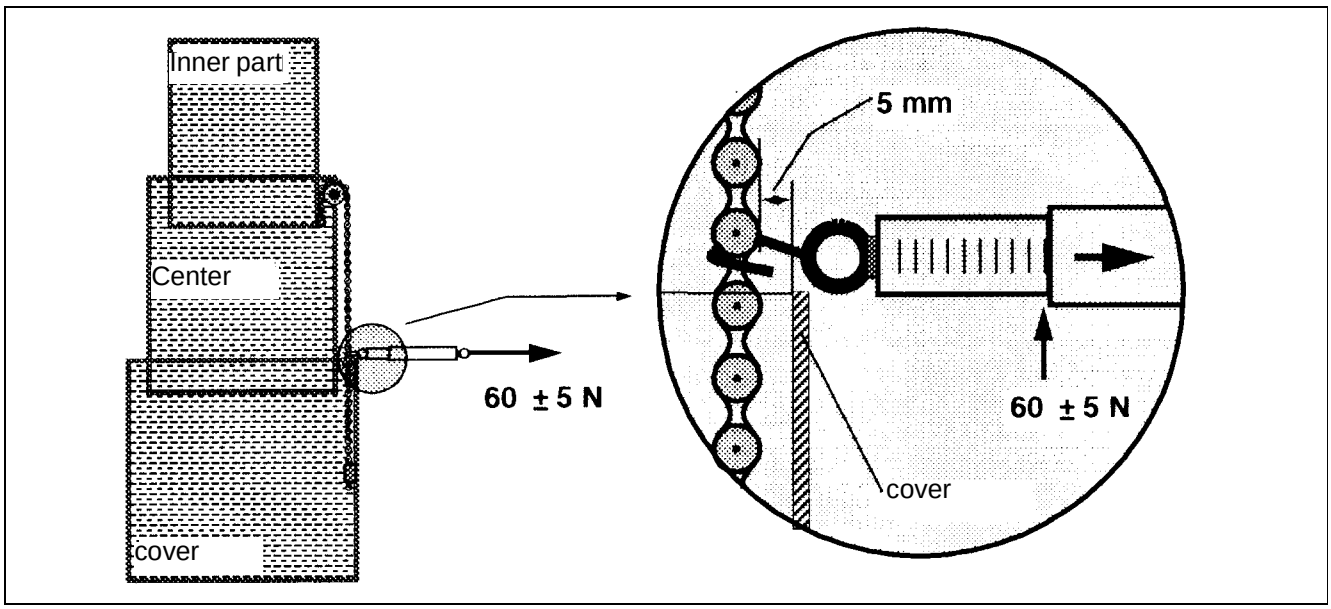

Fig. 5

2.7 Operating values - inspection

2.7.1 Lifting base

PMF Lifting drive chain

- Check the tension on the lifting chain.
  - Raise the table all the way up.
  - Pull the lifting drive chain with the spring scale approx. 5mm toward the cover (Fig. 5). When the lifting drive chain defelects 5mm, you must read 60 ± 5 N.

2.7.2 Spotfilm device

QSQ Radiation field

- Check the coincidence of the light and radiation fields with the large focus.

☢

  - Put a 24 x 18 cassette loaded with film on the tabletop and mark the edge of the light field with washers.
  - Release an exposure using values 45 kV, 3.2 mA.
  - Develop the film.
  - Measurethedeviationsbetweenthelightandradiationfields;theymustbesmallerthan0.5cm.

QSQ Central beam

- Check the coincidence of the radiation field and film center and, if necessary, adjust it according to Adjustment Instructions RLL5-310.071.01..., chapter 10, page 10-2.

2.7.3 Collimator blades

PMA Belt tension

- Measure the tension of the drive belt for the primary collimator blades:
  Nominal value = 5 N at 22 mm.
- If necessary, correct the tension by adjusting the drive motor.

2.7.4 Cassette drive

PMA Belt tension

- Check the tension of the drive belt for the cassette drive according to Adjustment Instructions RLL5-310.071.01., chapter 8, page 8-1 and, if necessary, adjust it.

NOTICE	**If the tension was adjusted, reference switch S51 for the cassette height measurement must be recalibrated. Refer to Adjustment instructions RLL5-310.071.01.., chapter 8, page 8-3.**

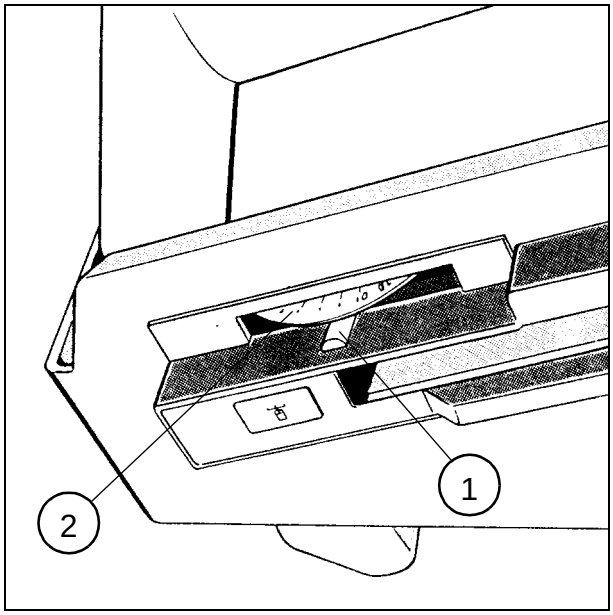

Fig. 6

2.8 Function inspection

PMF Spotfilm device

- Load a 24 x 18 cm cassette.
- Set R or L exposure (1/Fig. 6).
- Set a random time on the timer (2/Fig. 6).
- Release an exposure with 45 kV and automatic exposure control.
- Check the film exposure.
  The R or L as well as the time indication must be clearly visible on the developed film.

PMF Cassette recognition

- Load a 43 x 35 cassette horizontally.
  The cassette must be retracted into the spotfilm device and then ejected back into the loading position.
  The spotfilm device should sound an acoustic warning.

NOTICE	**The 43 cm horizontal format has not been included in the cassette program.**

PMF Cassette transport

- Load a 43 x 35 cm cassette vertically.
- Visually check the loading mechanism for smooth, even movement.

NOTICE	**The guide rails do not always raise the cassette on the right side of the spot film device ; only under certain circumstances.**

- Unload the cassette. You must be able to remove the cassette easily from the cassette compartment.
- Press the load switch to test the loading mechanism without a cassette,
  - the clamping arms may not oscillate in the minimum opening position,
  - safety limit switch s57 should not respond in the maximum opening position.
- If necessary, recalibrate the reference switch s 51 (refer to Adjustment Instructions RLL5-310.071.01.., chapter 8, page 8-3).

2.9 Component quality inspection

QIQ Tomography (Uroskop D2/D3 only)

for systems with tomographic device only (UROSKOP D2/D3)

- Check the tomographic device by releasing exposures, in accordance with Adjustment Instructions RLL5-310.071.01.02.01, chapter 4, page 4-3.

2.10 Care

PMP System

- Switch the system OFF prior to cleaning or disinfecting.

PMP Displays and indicators

- Wipe off all indicators with a damp cloth or cotton wadding. Use water or a lukewarm solution consisting of water and a household cleaner to dampen the cloth.

  Do not use abrasive cleaners, (due to possible material incompatibility) organic cleaners or cleaning agents containing organic substances (e.g. benzine, alcohol, spot remover).

PMP System covers

Do not use abrasive cleaners, (due to possible material incompatibility) organic cleaners or cleaning agents containing organic substances (e.g. benzine, alcohol, spot remover).

Do not spray wash the system. Cleaning fluids must not be allowed to seep into the system.

- Clean and reinstall the covers. Reconnect all protective conductors.

2.11 Concluding steps

PMF Protective conductor test

- Perform the final protective conductor test according to TI 236, section VII. Maximum total resistance: 0.2 ohm.

3 Changes to previous version

New layout (converted to new templates)

Work steps expanded and sequence changed.

TDSP 2 / Fleischter
TDSP 1 / Groß

SMS Iselin / O’Donnell

This page intentionally left blank.